

### **REMARKS**

Claims 1, 4-8 and 13-15, 17-21 and 24-29 are all of the claims pending in the present Application. Claims 6-8 and 19-20 have been withdrawn. Claims 15 and 27 have been amended.

While the claim amendments made herein may help to distinguish the invention over the prior art, Applicant's intention in making the amendments is for the purpose of particularly pointing out the invention, and not for the purpose of distinguishing the invention over the prior art, narrowing the claims, or for any statutory requirements of patentability. Further, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

**Claims 21 and 28** stand rejected under 35 U.S.C. § 112, second paragraph as being allegedly indefinite.

**Claims 1, 4, 5, 13-15, 17, 18, 21 and 24-29** stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Shiozaki (WO 03/044881) in view of Cho et al. (U. S. Patent Pub. No. 2003/0211391).

**Claim 16** stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Shiozaki in view of Cho, and further in view of Tsushima et al. (U. S. Patent No. 6,294,292). (Applicant notes that in this rejection on page 6 of the Office Action, the word "Howard" is used instead of "Cho", but Applicant believes that this is a clerical error, and thus Applicant is reading this rejection to be based on Shiozaki, Cho and Tsushima).

These rejections are respectfully traversed in the following discussion.

#### **I. THE CLAIMED INVENTION**

An exemplary embodiment of the claimed invention, as set forth in independent claim 1, is directed to a positive active material including base particles able to dope and release lithium ions.

Importantly, the positive active material also includes **at least one element selected from the group consisting of Gd, Ce and Yb on at least part of a part of the base particles which is**

able to come into contact with an electrolyte, and the at least one element is formed on a surface of the base particles, and is not incorporated in the base particles (Application at page 38, lines 16-24; page 39, line 25-page 40, line 5).

Conventional positive active materials include base particles (e.g.,  $\text{LiCoO}_2$ ). Attempts have been made to modify a surface of these materials with an element of a different kind (e.g., aluminum) to improve electron conductivity. However, this method does not inhibit the oxidative decomposition of the electrolyte in a positive-electrode field (Application at page 2 lines 11-20).

In the claimed invention of claim 1, on the other hand, the positive active material includes **at least one element selected from the group consisting of Gd, Ce and Yb on at least part of a part of the base particles which is able to come into contact with an electrolyte, and the at least one element is formed on a surface of the base particles, and is not incorporated in the base particles** (Application at page 38, lines 16-24; page 39, line 25-page 40, line 5). This feature may help to inhibit a reaction between the electrolyte and the positive active material and, thus, inhibit a deterioration of performance of a battery (Application at page 11, line 1-page 12, line 9).

## II. THE 35 USC 112, SECOND PARAGRAPH REJECTION

The Examiner alleges that claims 21 and 28 are indefinite. However, Applicant submits that these claims are clearly defined and not indefinite.

In particular, the Examiner alleges that it is unclear whether "in terms of oxide" means the weight percentage relative to the amount of oxide material in the base material or whether it means the weight percentage of an oxide of the element relative to the total amount of the base particles and the elemental oxide".

Applicant notes that the present Application at Page 27, lines 3-7, states as follows:

*"The amount of the Group 3 element to be deposited  $(= (\text{weight of the Group 3 element in terms of oxide}) / (\text{weight of the base} + \text{weight of the Group 3 element in terms of oxide}) \times 100)$  is desirably from 0.05% by weight to 4% by weight."*

Further, the present Application at Page 38, lines 5-21, states as follows:

*“The state of the Group 3 element imparted was analyzed by X-ray photoelectron spectroscopy (XPS). As a result, a 4d spectral line was observed at around 143.8 eV. This was completely coincident with a spectral line observed separately with commercial Gd<sub>2</sub>O<sub>3</sub>. These results indicated that the Group 3 element imparted was present in the form of an oxide. Next, the treated powder was analyzed for composition by ICP emission spectroanalysis. As a result, the amount of the Group 3 element compound imparted was found to be 0.6% by weight in terms of Gd<sub>2</sub>O<sub>3</sub> amount based on the weight of the whole base. The composition of the base was found to be Li<sub>1.01</sub>Mn<sub>0.167</sub>Ni<sub>0.167</sub>Co<sub>0.67</sub>O<sub>2</sub>. As a result of X-ray diffractometry (XRD), no diffraction line attributable to Gd<sub>2</sub>O<sub>3</sub> was observed. Furthermore, no difference in lattice constant was observed between the untreated base particles and the treated powder.”*

Thus, Applicant notes that the words “in terms of oxide” mean “(weight) calculated assuming that an element is changed into an oxide”, and not “(weight) of an oxide”. A quantitative analysis value obtained by the “ICP emission spectroanalysis” is only an amount of element. It can not be known by the analysis that the element is present in the form of the oxide. As described as “As a result of X-ray diffractometry (XRD), no diffraction line attributable to Gd<sub>2</sub>O<sub>3</sub> was observed.”, actually, there is a case where it cannot be acknowledged that the element is present in the form of the oxide.

Further, Applicant respectfully submits that one of ordinary skill in the art would understand the words “in terms of oxide” to mean “(weight) calculated assuming that an element is changed into an oxide”, and not “(weight) of an oxide”.

Thus, the claims (e.g., claims 21 and 28) of the present application do not necessarily define that the element must be present in the form of the oxide.

In view of the foregoing, the Examiner is respectfully requested to withdraw this rejection.

### III. THE ALLEGED PRIOR ART REFERENCES

#### A. Shiozaki and Cho

The Examiner alleges that Shiozaki would have been combined with Cho to form the invention of claims 1, 4, 5, 13-15, 17, 18, 21 and 24-29. However, Applicant respectfully submits that these alleged references would not have been combined and even if combined, the alleged combination would not teach the features of the claimed invention.

In particular, Applicant respectfully submits that these references are unrelated. Indeed, no person of ordinary skill in the art would have considered combining these disparate references, absent impermissible hindsight.

In fact, Applicant submits that the references provide no motivation or suggestion to urge the combination as alleged by the Examiner. Indeed, these references clearly do not teach or suggest their combination. Therefore, Applicant respectfully submits that one of ordinary skill in the art would not have been so motivated to combine the references as alleged by the Examiner. Therefore, the Examiner has failed to make a prima facie case of obviousness.

Moreover, neither Shiozaki, nor Cho, nor any alleged combination thereof teaches or suggests "*at least one element selected from the group consisting of Gd, Ce and Yb on at least part of a part of the base particles which is able to come into contact with an electrolyte, wherein said at least one element is formed on a surface of said base particles, and is not incorporated in said base particles*", as recited in claim 1 and similarly recited in claims 24 and 29 (Application at page 38, lines 16-24; page 39, line 25-page 40, line 5). As noted above, this feature may help to inhibit a reaction between the electrolyte and the positive active material and, thus, inhibit a deterioration of performance of a battery (Application at page 11, line 1-page 12, line 9).

Clearly, these features are not taught or suggested by Shiozaki or Cho.

In fact, the Examiner expressly concedes that Shiozaki does not teach or suggest these features on page 4 of the Office Action.

Likewise, Cho does not teach or suggest these features of the claimed invention.

Indeed, Applicant notes that Cho teaches an active material for a battery, and a surface-treatment layer formed on the active material (Cho at Abstract). In particular, Cho teaches the following:

*The element M used for the coating liquid is an alkali metal, an alkaline earth metal, a group 13 element, a group 14 element, a transition metal, a rare-earth element, or a combination thereof. The preferable examples of these elements are Al, Ni, Co, Zr, Mn, Cr, Fe, Mg, Sr, V, or a combination thereof. The group 13 element (according to the new IUPAC agreement) refers to the element group including Al of the Periodic Table. The group 14 element (according to the new IUPAC agreement) refers to the element group including Si of the Periodic Table.* (Cho at [0039])

*As shown in Table 2, the surface-treatment does not have an effect on charge-discharge characteristics at 0.1 C of the positive active materials. But the comparison of the amounts of exothermic heat shows that the amounts of the exothermic heat of Examples 1 and 2 are about 7.14 to 11.90% of that of Comparative Example 1.* (Cho at [0078])

That is, Cho discloses to apply “element M” to an active material, and discloses, as the “element M”, extremely broad range of various elements by specified in the form of broader concept thereof, such as “an alkali metal, an alkaline earth metal, a group 13 element, a group 14 element, a transition metal, a rare-earth element, or a combination thereof”. However, Cho specifically exemplifies, as the “element M”, “Al, Ni, Co, Zr, Mn, Cr, Fe, Mg, Sr and V”. Further, the “element M” specifically disclosed in the working example is only “Al”. In view of the disclosure in paragraph [0078] or the like, the effect of the invention of Cho is to provide “good thermal stability”.

On the other hand, an effect of the claimed invention is that “to provide: a positive active material which can inhibit side reactions between the positive electrode and an electrolyte even at

a high potential and which, when applied to a battery, can improve charge/discharge cycle performance without impairing battery performances even in storage in a charged state” (see Application at page 6, lines 12-18). Accordingly, an effect of the present invention is quite different from that of Cho.

The elements characterized by the present invention is “Gd, Y, La, Ce and Yb”. However, Cho is specifically silent about any one of the elements. In fact, only one element specifically described in the working example of Cho is “Al”, which is the element as described in Comparative Example 3 in the specification of the present application (Applicant directs the Examiner's attention to Table 3 in the specification of the present application). The degree of an effect of the present invention can be evaluated by the value in the column of “Floating integrated ampere-hour capacity ( $\mu\text{Ah/g}$ )”. The lower the value, the more superior is the effect of the claimed invention, and in other words, the greater the value, the more inferior is the effect. Applicant notes that Comparative Example 3 using “Al” is rather inferior to Comparative Example 2 applying no element. That is, with respect to the effect of the present invention, the case of applying “Al” is rather inferior to the case of applying nothing.

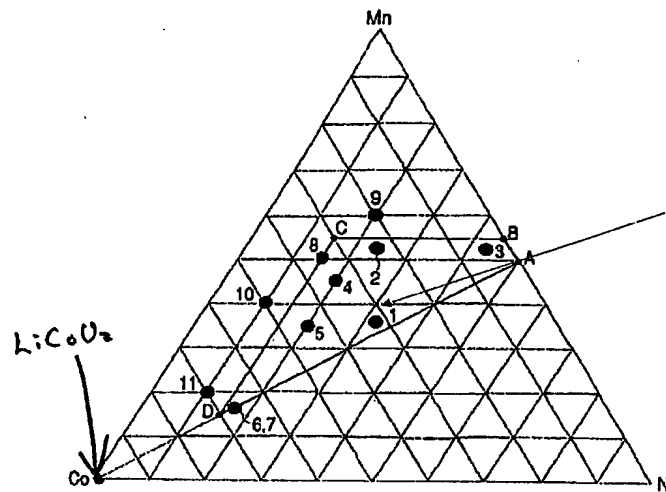
Thus, as can be seen from the above explanation, even when the “positive active material” per se according to the claimed invention was known at the time when the present application was filed, the claimed invention is unobvious from the combination with the disclosure of Cho. On the contrary, because Cho discloses, in the working example thereof, “Al” which should not be used in order to take the effect of the claimed invention, Cho clearly teaches away from the claimed invention and has a lack in aptitude as a cited reference.

Thus, Cho does not make up for the deficiencies in Shiozaki.

Moreover, since Shiozaki discloses only the “positive active material” having the specific composition, even when Shiozaki is combined with Cho, the claimed invention is unobvious from the combination.

Further, with respect to claims 4 and 17, Applicant would again point out that, referring to the Examiner's position, although the Examiner states on page 3 of the Office Action that “Shiozaki further discloses that the positive active material may comprise  $\text{LiCoO}_2$  which corresponds to point A on fig. 1.”, because “point A” is not a point corresponding to  $\text{LiCoO}_2$ , but

is a point corresponding to  $\text{LiMn}_{0.5}\text{Ni}_{0.5}\text{O}_2$ , the Examiner is not correct.  $\text{LiCoO}_2$  corresponds to the bottom-left corner of ternary phase diagram, but  $\text{LiCoO}_2$  does not include the composition range fallen within quadrilateral ABCD, as shown in the ternary phase diagram below.



Accordingly, contrary to the Examiner's allegations, Shiozaki does not disclose or suggest  $\text{LiCoO}_2$ . However, even assuming (arguendo) that Shiozaki discloses  $\text{LiCoO}_2$ , it is clear from the above discussion that the claimed invention is unobvious from both Cho and Shiozaki.

Therefore, Applicant respectfully submits that these alleged references would not have been combined and even if combined, the combination would not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

#### B. Tsushima

The Examiner alleges that Shiozaki and Cho would have been further combined with Tsushima to form the invention of claim 16. However, Applicant respectfully submits that these alleged references would not have been combined and even if combined, the alleged combination would not teach the features of the claimed invention.

In particular, Applicant respectfully submits that these references are unrelated. Indeed,

no person of ordinary skill in the art would have considered combining these disparate references, absent impermissible hindsight.

In fact, Applicant submits that the references provide no motivation or suggestion to urge the combination as alleged by the Examiner. Indeed, these references clearly do not teach or suggest their combination. Therefore, Applicant respectfully submits that one of ordinary skill in the art would not have been so motivated to combine the references as alleged by the Examiner. Therefore, the Examiner has failed to make a prima facie case of obviousness.

Moreover, neither Shiozaki, nor Cho, nor Tsushima, nor any alleged combination thereof teaches or suggests "*at least one element selected from the group consisting of Gd, Ce and Yb on at least part of a part of the base particles which is able to come into contact with an electrolyte, wherein said at least one element is formed on a surface of said base particles, and is not incorporated in said base particles*", as recited in claim 1 and similarly recited in claim 24 (Application at page 38, lines 16-24; page 39, line 25-page 40, line 5). As noted above, this feature may help to inhibit a reaction between the electrolyte and the positive active material and, thus, inhibit a deterioration of performance of a battery (Application at page 11, line 1-page 12, line 9).

Clearly, these features are not taught or suggested by Tsushima.

Indeed, Tsushima simply teaches a secondary power source having a high upper limit voltage. That is, like Shiozaki and Cho, Tsushima does not teach or suggest at least one element selected from the group consisting of Gd, Ce and Yb on at least part of a part of the base particles which is able to come into contact with an electrolyte, and the at least one element is formed on a surface of the base particles, and is not incorporated in the base particles, as in the claimed invention.

Thus, Tsushima does not make up for the deficiencies in Shiozaki and Cho.

Therefore, Applicant respectfully submits that these alleged references would not have been combined and even if combined, the combination would not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.



**IV. FORMAL MATTERS AND CONCLUSION**

In view of the foregoing, Applicants submit that claims 1, 4-8 and 13-15, 17-21 and 24-29, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

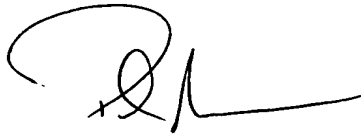
Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date:

8/25/10



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